Providing Habitat Needs for Wildlife Through Forest and Agricultural Management

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In general, good habitat conditions for wildlife can be created while managing timber or farming operations. In some cases, no additional costs are required. Information presented here will help in planning for an integrated land management program that optimizes timber growth, crop production, wildlife habitat, and recreational opportunities on private land.

When considering improvements for wildlife habitat during land management operations, landowners and natural resources professionals need to be aware of the habitat requirements of wildlife. Wildlife have four basic needs: food, cover, water, and space. The quantity and quality of these components determine the carrying capacity of the land – the maximum number of animals that can be supported in good condition throughout the year. Carrying capacity changes by season and by year as a direct result of changes in farm and forest habitat.

Providing Wildlife Habitat in Woodlands

With proper planning, forest management can be conducted in such a fashion as to improve habitat conditions for certain species of wildlife. In a truly integrated forest and wildlife management operation, the goal of maximum timber production is compromised in favor of producing quality habitat for wildlife. A reasonable compromise between maximum timber production and quality habitat ensures sustained profits from forest products as well as suitable habitat for wildlife.

As forests are altered to grow timber products, wildlife habitats are also changed. Forest management operations that affect habitats include harvesting, site preparation, forest regeneration practices, and intermediate stand treatments. Each of these forestry practices will affect habitats by altering certain characteristics of the forest. Some of the habitat characteristics that influence wildlife are edge, habitat diversity, interspersion, and plant succession. Forest stand arrangement also has an effect on the quality of wildlife habitat. Stand arrangement refers to how the forest stands are located in relation to each other. For quality wildlife habitat, forest stands providing habitat components must be available within the home ranges of the wildlife species being managed. Proper arrangement of food, water and cover can often determine the use and value of these habitat components to wildlife. Poor arrangement of habitat components fails to make the best use of a particular site for wildlife. Size and arrangement of forest stands largely determine the quantity and quality of edge and total forest diversity that is created. A mixture of brushland, woodland, and non-forested land creates more diversity and edge than does a large block of one timber type.

Habitat Succession in Forests

After harvest, woodland sites go through a series of vegetation changes known as succession. These changes occur whether a site is prepared and planted in trees or allowed to revegetate naturally. Through each successional change, certain species of wildlife are favored over others. An area of land may be set back to the earliest stage of succession (bareground) by mechanical or chemical means, fire or some natural catastrophe. During the first year, light, airborne-seeded plants become established. At this time, mourning doves and songbirds will find the area desirable. After 1 to 3 years of age, heavy-seeded and berry-producing plants (legumes, forbs grasses) that favor quail and other small game appear. Turkey broods find these areas useful for feeding on seeds and insects and deer will feed on the encroaching herbaceous and woody growth.

During the 3rd to the 8th year, broomsedge, grasses, blackberries, and hardwood sprouts are plentiful. Habitats are created that favor rabbits, turkeys, deer and many species of songbirds. Deer browse and cover is generally greater during this period than at any other time. During this time nesting sites for quail, turkeys and many songbirds are abundant.

At age 8 to 10 years crown closure of trees is usually achieved and the production of understory food plants is suppressed by shading. A wide variety of wildlife will use these areas for nesting and escape cover. As the forest matures, cavity-nesting wildlife such as raccoons, squirrels, owls and nongame mammals will inhabit the site.

Forest Harvest and Regeneration

Several harvest and regeneration systems are common in the South for removing and re-establishing trees. The type of system used depends on such factors as species of trees in the stand, site characteristics, condition of the forest, and economics. In the South, forests are usually managed either by even-aged or mixed species systems.

Even-Aged Management

Clearcutting

Clearcutting is the most commonly used method to harvest both pines and hardwoods in South Carolina. Contrary to popular belief, clearcutting can be a valuable wildlife management practice if shape and arrangement are taken into account. Small (up to 50 acres) and irregularly shaped clearcuts are better for many species of wildlife than large, square cuts. Animals such as deer are reluctant to move more than 100 yards from escape cover; therefore, a high percentage of large clearcuts are unusable. In addition, irregularly-shaped cuts create far more edge than square cuts of the same size. Small clearcuts in adjacent stands should be scheduled 6 to 8 years apart to increase stand age-class diversity. This diversity offers a greater variety of habitat components for wildlife.

Clearcuts can be artificially regenerated by direct seeding or by planting of seedlings after the area has been site-prepared. Germination of seeds and stocking density of seedlings is difficult to determine when directly seeding a clearcut. Poor germination rates can result in understocked stands. On the other hand, high germination can result in a timber stand that is extremely dense and of little value to wildlife. Artificial regeneration, at a high seedling density, usually results in rapid tree crown closure with little production of understory food plants. Planting pine seedlings offers an option to control seedling density and increasing the production of understory vegetation valuable to wildlife. These sites can be made more desirable for wildlife by using a wide seedling spacing when planting. Spacings such as 8 X 10 feet or 10 X 10 feet for pines will provide adequate growing stock densities and optimize the production of understory vegetation for wildlife.

Seed-tree

Seed-tree harvesting is closely related to clearcutting. The same guidelines for size, shape, and arrangement of harvests are appropriate. Seed-tree regeneration requires leaving enough high quality, mature trees (10 to 25 per acre) to successfully seed an area and establish a new stand. Good results can be obtained when the site is burned before seed fall to expose mineral soil. After the seedlings are well established, the overstory (seed trees) can be harvested, or in some cases left in place. The value of seed trees will determine what action, if any, is taken. Where economically feasible, seed trees are sometimes removed after stand establishment is underway. If it is not feasible to remove seed trees, then they can be deadened by injection with a herbicide and left to serve as denning and roosting trees within the younger forest.

Shelterwood

Shelterwood cuts involve thinning mature stands to a density that allows full sunlight to reach the forest floor (30 to 50 square feet basal area). After clearcutting, the area is burned. The combination of exposed seedbed, reduced competition, and nearly full sunlight creates favorable conditions for high rates of pine seedling production. The residual overstory is then harvested. Shelterwood cuts provide cover and food for wildlife until the sheltering trees are cut and the trees beneath them begin to mature.

Seed-tree or shelterwood cuts can result in regeneration rates as high as 10,000 pine seedlings per acre. When this occurs, stands must be thinned precommercially. Seedlings should be thinned as early as possible (age 1 to 3 years) to a 8 X 10 feet or 10 X 10 feet spacing. Wider spacing will delay crown closure, allow sunlight to reach the forest floor for a few more years, and stimulate the production of understory vegetation valuable to wildlife. Harvesting residual seed trees will also disturb and thin the seedlings. Desired stocking rate for 1 to 3 year-old pines is approximately 350+ seedlings per acre, resulting in an adequate growing stock of timber and enhanced wildlife food plant production.

Mixed Forest Management

Many privately owned woodlands in the South are not intensively managed under an even-aged system. Most private woodlands are composed of mixed pine-hardwood or mixed hardwood forests that are rich in plant diversity and wildlife. Mixed forest management provides an economic alternative for landowners lacking the investment capital required of intensive, even-aged management.

Harvesting systems most often used in managing mixed forest are group and individual tree selection cuts. Selection cuts are somewhat different than clearcuts. With these methods, individual or groups of trees can be selected for harvest. This is an ideal harvest method in a timber stand which has a variety of trees that require different amounts of sunlight. The mixture of trees resulting from a selective harvest is beneficial to many wildlife species since it increases diversity and edge in the forest. Single tree selection is often used, and many times results in high grading (cutting the best and leaving the rest) of the forest. If this method is chosen, care should be taken to ensure that lower quality (wildlife value) trees remain in the forest stand. A better selection method is to harvest small groups of trees, ⅒ to 1 acre in size, giving proper consideration to the arrangement of these small cuts. With this system, you can preserve the most valuable timber and wildlife trees and improve the overall diversity of the forest. Desirable hardwoods such as hickories and oaks provide valuable timber and wildlife food and reproduce well by sprouting from stumps in response to proper harvesting procedures. Regeneration of desirable hardwood species begins to appear as seedlings in the understory of middle-aged stands. Thinnings help stimulate the establishment of seedlings. Once regeneration has become dense, at least 50 percent of the overstory should be removed. Undesirable tree species can be eliminated from mixed stands using pre-harvest injections or thinline applications of appropriate herbicides. Using natural regeneration in these stands provides opportunities for leaving snags and den trees that favor squirrels and cavity-nesting mammals and birds.

Site Preparation

After harvest, site preparation is often used to ready an area for re-establishment of a forest. In South Carolina, this is usually done by mechanical methods, chemical methods, or a combination of both.

Mechanical Site Preparation

Mechanical site preparation techniques range from simple chopping and burning to the 3-pass system of shearing, raking, and windrowing. In soil-sensitive areas, a new technique called fell and burn has proven effective for low-cost site preparation.

Three-pass site preparation is often used to convert mixed hardwood stands to pine plantations. In general, the less intensive mechanical methods are better for wildlife. More intensive systems promote quicker seedling growth at the expense of preferred wildlife food plants. Intensive systems allow pine seedlings to achieve crown closure quickly; therefore, shading and retarding the growth of understory food plants. In most cases, roller chopping and burning is an adequate site preparation for pine establishment, is most beneficial to wildlife, and is less costly than 3-pass site preparation.

Use of windrows for storing logging debris is used with intensive mechanical site preparation. If feasible, avoid windrowing since it usually results in serious soil disturbance. However, if windrows are not burned, they produce excellent habitat for rabbits and other small mammals. Many preferred wildlife food plants, such as blackberries and pokeweed, will grow easily on unburned windrows but poorly on land between windrows.

Timing of mechanical site preparation can have a profound effect on wildlife habitat. Winter site preparation favors large-seeded plants (ragweeds and legumes), while early fall site preparation favors smaller windborne-seeded plants. Site preparation should be performed in late winter or early spring. Summer or fall site preparation results in a lower abundance and variety of vegetation the following winter.

Fell and Burn Site Preparation

Fell and burn site preparation involves the spring felling of standing residual trees left after a commercial clearcut followed with a controlled burn the following summer. Fell and burn techniques can result in a mix of pine and hardwoods which can be excellent for wildlife. In addition, stand establishment costs are about half that of intensive site preparations in pine plantations. Fell and burn techniques have been used successfully by the U.S. Forest Service in the Andrew Pickens District of South Carolina.

Chemical Site Preparation

The use of herbicides for site preparation can result in complete elimination of vegetation from a site for up to 2 growing seasons after a broadcast application. As with high intensity mechanical methods, herbicides are most often used when converting natural or mixed forests to pine plantations. If the use of herbicides is confined to strips where pine seedlings will be planted, areas between strips are free to grow in natural vegetation. Overall costs are reduced and habitat degradation is minimized.

Herbicide application for site preparation creates some habitats important to nongame animals like red-cockaded woodpeckers. Large woody stems are killed and left standing to be used by birds and squirrels as cavity nests and perching sites.

Trends in modern forest management, especially where wildlife habitat is to be managed, are toward lower costs and lower intensity site preparation techniques. Landowners have found that the resulting reduction in tree growth is acceptable if investment costs are appropriately reduced. Additional landowner benefits are gained in the form of improved wildlife habitat.

Intermediate Stand Treatments

Intermediate stand treatments improve conditions for tree growth by concentrating growth on the best quality trees. These treatments can also increase the quantity and quality of wildlife habitat. Commonly employed intermediate stand treatments are thinning of trees, prescribed burning, and fertilization.

Thinnings

Thinnings of inferior trees allow remaining trees more room to grow and concentrates growth on the higher quality trees. After crown closure, tree growth begins to slow due to competition with adjacent trees for sunlight, nutrients and water. Thinnings open up stands and "release" healthy trees, thereby increasing growth rates.

Thinning a closed stand also allows sunlight to reach the forest floor and stimulates the production of understory vegetation. After a thinning, understory forage production peaks in 2 to 3 years; fruit and browse production peaks in about 5 years. To maximize benefits for deer, thin forest stands to a basal area of 60 to 70 square feet per acre. As a good compromise between timber and wildlife interests, thin fast-growing pine stands initially at age 12 to 20 years and every 5 to 7 years thereafter until final timber harvest.

Prescribed Burning

Fire is used as a forest management tool in pine forests to reduce fuel loads on the forest floor, eliminate hardwood competition in pine forests, and prepare the site for planting and seed germination. A properly timed fire can also stimulate the growth of understory herbaceous plants. This makes fire a valuable wildlife habitat management tool.

Fire is most often used to reduce fuel loads. Without regular controlled burnings, an understory of hardwood sprouts, shrubs, and vines rapidly develops in pine stands. When draped with pine straw, this understory becomes highly flammable, and the stand is in danger of being destroyed by wildfire. Controlled, low-intensity fires reduce such dangers and can modify wildlife habitat by regulating the understory plant composition. Prescribed fire, if conducted properly, generally improves habitat by favoring legumes and herbaceous plants, by stimulating the germination of seeds stored in the litter, and by setting back succession to create and maintain cover. Studies have shown that prescribed burning increases the nutrient content and palatability of many plants valuable for wildlife.

To gain the maximum wildlife habitat benefit from fire, timing of the burn must be considered. Late winter (mid-January to mid-March) burning destroys little forage, quail and turkey nesting is not disturbed,

and springtime production of plants and insects is enhanced. Late winter, low-intensity, and "patchy" burns leave small pockets of unburned vegetation necessary for escape and nesting cover. Burning should be conducted every 1-5 years, depending on the productivity of the site.

Prescribed burning should only be conducted in pine stands since hardwoods are very susceptible to fire damage. Prescribed burning should only be conducted by trained professionals. A burning permit is required by the South Carolina Forestry Commission before any burns are conducted. For more information on prescribed burning, contact the South Carolina Forestry Commission.

Fertilization

Fertilization of forest stands is a relatively new practice that has limited use. Generally, fertilization increases understory forage production (20 to 30 percent) but decreases the diversity of plants. Studies indicate that nitrogen-phosphorus-potassium fertilizers may depress legumes and favor grasses and forbs. The protein levels of some wildlife food plants, especially honeysuckle, can be dramatically increased by fertilization.

Timber Stand Releases

Growth of high value trees, for both wildlife and timber, can be enhanced by reducing competition with poor quality trees. Practices which reduce the number of low value trees from a stand are referred to as wildlife and timber stand improvements (WSI and TSI). Competing trees can be selected against by injecting herbicide into the tree or by cutting the tree down. The effects of releasing higher valued trees in a stand can increase the amount of growth (volume of wood) per tree and for the entire stand, and at the same time increase crown size which relates proportionally to the amount of mast (acorns, nuts and other hard and soft fruit) produced for wildlife on the remaining trees.

Other Wildlife Habitat Improvements

In addition to improving wildlife habitat during normal timber operations, you can use other practices to enhance wildlife habitat. The following are examples of these practices.

Herbaceous Openings

Herbaceous openings are areas where the ground is covered with a mixture of grasses and other non-woody plants. These openings are important as nesting, brood-rearing and feeding areas for quail, turkeys and other wildlife. Herbaceous openings can be maintained by bushhogging, disking, burning or cultivating so that these areas do not become too overgrown.

Travel Corridors

Timber harvests sometimes fragment forest wildlife habitat into isolated stands. For deer and turkeys to continue to use these areas freely, some type of travel corridor may be required through open areas to forested stands. Travel corridors should be established by leaving a strip of forest at least 100 feet wide between open areas. Properly arranged windrows can also serve as travel corridors by breaking up large open areas.

Timber Stand Age Class Diversity

Harvested sites should be arranged so that there is a 5 to 7 year age difference between adjacent stands of timber. This essentially creates a diverse forest landscape made up of scattered even-aged stands.

Streamside Management Zones (SMZ)

Streamside management zones are riparian forest adjacent to waterways that are managed for wildlife, soil and water conservation. The importance of SMZs in improving overall habitat cannot be overemphasized. Maintaining adequate forest on each side of a stream or drainage will provide diversity, travel corridors, and cover for deer, quail, turkeys, squirrels and other wildlife. Often the sides of such drainages are steep and difficult to harvest or plant, making it uneconomical to convert these sites from mixed forest to pine plantations. Leaving natural forest intact as SMZs improves habitat diversity and also helps protect the watersheds. If SMZ vegetation is removed, erosion will gradually decrease the productivity of the site for both timber and wildlife habitat.

Food Plots

Food plots are similar to herbaceous openings but are cultivated and planted in agricultural crops or other food plants for wildlife food. Before reforestation begins, food plots should be planned at a rate of 1 acre of food plot per 25 acres of forest. Plot sizes should range from ½ acre for small game and 2 to 5 acres for larger species of wildlife such as deer and turkeys. Food plots aid in concentrating game for harvest and, in times of low availability of natural foods, can serve as a supplemental food source for wildlife. Food plots should not be used as a substitute for properly managing native vegetation (wildlife food plants) through forestry practices. For more information on the cultural requirements for establishing food plots, see Clemson Extension publication *Wildlife Planting Guide and Native Wildlife Plants in South Carolina.*

Den and Mast Trees

In pine plantations, mast-bearing oaks, hickories, and dogwoods should be present. These, along with any standing den trees or snags, should be protected from harvest, fire, and logging damage. Because they are usually of poor form, these trees rarely have any value in the wood products market, but can be invaluable when retained for wildlife.

Abandoned House Sites

During the small farm era of the South, good wildlife habitat was created around small fields bordered by wide fence thickets and wooden buildings. Remnants of old house sites on forested lands still retain conditions attractive to wildlife. Shrubs, vines, and fruit trees that were planted in the past will last for many years. Old house sites and associated areas should be protected from fire and logging damage.

High Value Habitats

Some sites that are marginally suitable for forest management are highly valuable for wildlife. Bays, swamps, and wetlands are costly to drain, and in most cases this action is illegal. These areas provide important escape, denning, and brood-rearing cover for black bears,

deer, turkeys, squirrel, waterfowl and many species of non-game wildlife.

Grazing

Some studies have shown that short duration rotational grazing, when carefully controlled in pine woodlands, has a positive effect on the production of certain plants valuable to wildlife. Grazing, if conducted properly, can be used to push back succession to promote grasses and forbs. Under ideal conditions, grazing can favor forb production by reducing competition with grasses, expose seeds for germination, and serve to prepare seedbeds for plant growth. This practice should only be considered if a well-defined rotational grazing program is in place that minimizes the negative impact on wildlife habitat.

Providing Wildlife Habitat on Farms

Farming practices in South Carolina can have profound effects on wildlife habitat. Many opportunities exist for farmers to efficiently manage wildlife habitats along with agricultural operations. The key to profitable management is to integrate management practices beneficial to wildlife while sustaining agricultural productivity. Recommended practices generally emphasize wildlife habitat as a complementary land use on crop and pasture lands.

Two factors have been responsible for an overall decline in quantity and quality of wildlife habitat on southern farmlands: 1) implementation of clean tillage from fencerow-to-fencerow, and 2) the adoption of monoculture systems common to intensively cropped areas. Before the availability of inexpensive nitrogen fertilizers, crop rotation was necessary for good crop production. Crop rotations provide a diversity of high-quality habitat. Small field farming, commonly practiced with low-power equipment, meant that hedgerows were maintained for rabbits, quail, songbirds and other wildlife.

Hedgerows

Hedgerows (strips of shrubs and trees) were once planted extensively to protect fields from wind erosion and to stabilize turn rows at the ends of row crop fields. Hedgerows generally consist of fast-growing woody and herbaceous plants that provide an important component of wildlife habitat cover. Many kinds of low-growing trees and shrubs can be used to establish hedgerows, including dogwoods, sawtooth oak, wild plums and blackberry. Diversity can be enhanced by adding a strip of legumes along the edge of hedgerows or in the corners of fields.

Maintaining high-quality hedgerows that already exist is as important as creating new ones. Hedgerows that are "even-aged" throughout their length can be improved through periodic cutting, mowing, disking or burning. If hedgerows are thinned every few years, a variety of different growth forms that are valuable to wildlife result.

Field Border Strips

Most farmers intensively manage croplands for a single product; soybeans, wheat, and corn are commonly grown in the South. While each of these plantings have some attractiveness and value for wildlife, habitat can be improved (especially for quail) by leaving unplanted strips (at least 20 feet wide) around the edges of fields. These strips, when allowed to grow up in native vegetation, provide different foods (insects, seeds and vegetation) and escape cover throughout the year. Often these edges are shaded by trees and are less productive than the rest of the field; therefore, little if any farm production is lost.

Plant diversity can be maintained by simply disking a strip along the field edge during routine seedbed preparation and then leaving the ground idle. A mixture of annual forbs (desirable weeds) usually grown in these areas and create food and cover for many wild animals.

Natural and planted strips on field borders, in combination with hedgerows, are important practices for improving habitat on farmlands. Taking advantage of existing plum, dogwood, and cedar thickets along fencerows will improve border effectiveness when allowed to spread up to 20 feet on either side of the fence. Grasses and forbs will fill the remaining areas, and almost all are valuable for wildlife. Widening borders increases the relative "predator proof" characteristics of hedgerows, providing quail, rabbits and songbirds escape cover from hawks, owls, foxes and other predators. Several rows of unharvested crops can also be left around the field border. These "crop strips" provide additional food and cover for wildlife.

Tillage Practices

Tillage practices that conserve both soil and moisture should be conducted. Clean-till practices not only encourage soil erosion, but reduce wildlife food and cover. If fall plowing is necessary, plow only a portion of the field, leaving unplowed borders or strips for spring tillage. Unplowed areas will retain stubble and weeds throughout the winter, providing both food and cover for wildlife.

Herbicides

Minimize herbicide applications that target wildlife cover and food plants whenever possible. Herbicides are often used to maintain a forest monoculture by reducing competition from plants valuable to wildlife. Where practical, refrain from using herbicides along borders and in mid-field strips, especially on larger fields. Careful use of herbicides can be a wildlife habitat improvement practice if wildlife plants are favored over lower quality plants. Herbicide programs for improving wildlife habitat can be tailored to individual site conditions, depending on competing plants and soil conditions.

Crop Rotation and Field Management

Crop rotation systems that use forage and small-grain crops should be encouraged. In addition to reducing fertilization needs, rotating crops every few years will enhance diversity and year-round availability of food and cover. Use winter cover crops such as winter wheat or rye in corn and soybean fields to reduce soil erosion and provide a desirable forage for deer and turkeys.

A minimum of ¼ acre of grain crops should be left unharvested for each 40 acres of crop field. Leave this food source in patches or strips near cover areas for maximum utilization. Where feasible, break large fields into smaller ones. Every farmer faces certain field-size constraints based on equipment, but smaller fields bordered by well-developed

hedgerows are more attractive to wildlife than are large, unbroken fields.

Marginal Cropland

Farmers should consider taking marginal cropland out of row crop production and reserving these areas for wildlife. Consideration should be given to placing these lands in one of the USDA Farm Bill programs for wildlife. Contact the local county USDA Natural Resource Conservation Service (NRCS) or Farm Services Agency (FSA) for more information about these programs.

Valued Areas

High-value habitats provide wildlife food and cover and should be protected and maintained. Fruit-producing trees in pastures and fields should be protected. Some of these areas may be enhanced with fertilizer applications.

Drainages and Ponds

Borders of waterways should be planted in grasses and legumes that are beneficial to wildlife and prevent soil erosion caused by runoff. Shallow-soil areas should be allowed to revegetate naturally or should be planted in warm-season grasses or a grass-legume mixture. Mowing of these areas should be avoided during the nesting season (April-June) of ground-nesting birds.

Grassy strips should be established around ponds to reduce sedimentation and to provide or enhance wildlife cover. Watering troughs below ponds should be used for cattle to prevent pond bank erosion from cattle use. A well-established and protected brushy area around a pond is a valuable nesting and brood-rearing site for Canada geese and other wetland wildlife such as amphibians, reptiles and aquatic furbearers.